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ABSTRACT

In a study about the comprehension of anaphoric relationships in text, three anaphoric ties in forward (antecedent-anaphor) and backward (anaphor-antecedent) position were examined with attention to developmental trends. A four-school sample was used, three in the United States and one in New Zealand. A test of comprehension of anaphoric relationships in forward and backward position, constructed for use in the study, consisted of four short stories, each between 100 and 150 words in length. The entire test included 24 anaphoric structures, four of each type (pronoun-referent, lexical, substitution/ellipsis) in forward position and four of each type in backward position. Results of the present study indicate that, although there are some differences in the patterns of anaphoric comprehension among the four samples, it is possible to identify trends that hold across the total group. In general, there is a consistent pattern of growth in comprehension from one age level to the next with the proportion correct for the entire group ranging from .28 at age 7 to .43 at age 8; .51 at age 9, .58 at age 10, .59 at age 11, and .56 at age 12. Examination of performance on anaphoric types and directions indicates that substitution/ellipsis structures were most difficult for all age groups and that referent structures were easiest for all except the 7-year-olds who found lexical structures easiest to comprehend. Results also indicate that all age groups except 7-year-olds found forward structures easier to comprehend than backward structures. (NKA)

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EFFECT OF TYPE AND DIRECTION ON COMPREHENSION OF ANAPHORIC RELATIONSHIPS

Among the aspects of text which influence reading comprehension are those which may interfere with the reader's ability to achieve textual cohesion. Anaphoric ties belong to that group of characteristics. Comprehension of anaphoric relationships in text is a part of the reading comprehension process which involves linguistic development, yet there is not a great deal of information about the increase in anaphoric comprehension with increase in age. Chomsky (1969) examined oral comprehension of syntactic structures in children ages five to ten. Studies of comprehension of the written structures (Bormuth, et al, 1970; Lesgold, 1974; Barnitz, 1980; Richek, 1976; and Moberly, 1978) seem to indicate that some written anaphoric structures are more easily understood than others and that comprehension increases steadily from grade two to grade six. However, information about comprehension of specific anaphoric structures and about the effect of direction of the tie location is incomplete for the age levels included in a typical elementary school reading program. Information across those age levels is needed if the reading curriculum is to deal adequately with the difficulties imposed by anaphora within the text.

Moberly (1978) tested fourth and sixth graders' comprehension of four forms of anaphora (referent, substitution, ellipsis, and lexical) in three locations (immediate, mediated, and remote). Significant differences in comprehension of the four forms and among the three locations were found. No consistent hierarchy of anaphoric comprehension was evident from the study. However, the order of difficulty for the total sample was pronoun-referent, substitution, ellipsis, and lexical forms. When fourth grade scores were examined alone, the order of lexical and ellipsis scores was reversed. Sixth grade scores were in the order

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of difficulty reported for the total sample. Identification of ellipsis and sbustitution structures followed the Halliday and Hasan (1976) classification system in which the anaphoric form for an item is omitted or replaced by a word such as "so" or "do." Moberly's test instrument included two short stories, each about a thousand words in length.

Barnitz (1980) investigated the effects of pronoun-referent structures on the reading comprehension of children in grades two, four and six. His test instrument included short passages of less than 100 words. Comparisons were made for referent type, defined as noun or noun phrase versus clause or sentence, reference order, forward reference (antecedent-anaphor) versus backward reference (anaphor-antecedent), and referent distance (pronoun and referent within the same sentence versus pronoun and referent located in separate immediate sentences.) Barnitz found that noun phrase pronominals were easier to comprehend than sentence pronominals. He reported that forward structures showed an overall higher proportionate score (.70) than backward structures (.58). He found no significant difrerence for referent distance, with pronouns located in separate sentences from referents as easily comprehended as those in the same sentence. Students in the three grades were significantly different in total scores, with higher grades having higher scores.

In a study of third graders' comprehension, Richek (1976) looked at understanding of anaphoric forms when they were represented in sentence context by noun, pronoun and null anaphoric forms. In general, the subjects showed incomplete grasp of the anaphora.

The effect of direction of anaphoric ties may be related to Piaget's theory of conservation and reversibility. It would seem that comprehension of an anaphoric tie requires ability to conserve. What Barnitz refers to as a backward anaphoric tie (anaphor-antecedent) may be linguistically more complex than the forward tie. There is some evidence (Chomsky, 1969) that children have more

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difficulty with backward ties in oral language than with forward ties, although the differences between forward and backward comprehension lessen as children move toward the upper ages of the concrete operations stage. Where comprehension of written material is concerned, it is clear that backward ties are less commonly found in print than forward ties and so may be more difficult for subjects on the basis of prior experience. Rozanski (1977) studied the relationship between first graders' ability to conserve, as measured by a test of Piagetian tasks, and their performance on a test of pronoun antecedents (anaphora) and found a significant relationship between the two functions. Whether backward structures require a stronger grasp of conservation and reversibility than forward structures remains in question. If that is the case, it would seem that performance by children of increasingly higher age groups should show corresponding increase in comprehension of backward structures until they reach nearly the level of comprehension shown for forward structures. That would seem to strengthen the argument for a relationship to Piaget's theory of conservation.

There is clearly a need for information about comprehension of anaphoric ties which extends beyond the pronoun-referent forms, includes backward and forward tie positions, and includes the range of age levels involved in elementary school reading programs. A review of the literature introduces two other factors which may influence the pattern of comprension. One is the distance between anaphor and antecedent and the other is the length of the passage used. In the case of distance between ties, Moberly (1976) found that immediate ties were significantly easier to comprehend than remote ties. Barnitz (1980) found that ties in immediate sentences were as easily comprehended as ties within the same sentence. The matter of passage length deserves special consideration. Chapman (1979) has emphasized the cohesion of text as an aspect of reading comprehension. He calls particular attention to the importance of looking at comprehension within the context of

continuous text. The complexity of text and the richness of contextual cues may have considerable influence on the understanding of anaphoric ties. The importance of context extends to the testing situation in terms of test construction and also in interpretation of results.

According to results from earlier studies, a pattern of consistent growth for all structures would be expected throughout the elementary school years. Furthermore, superiority on forward structures (antecedent-anaphor) over backward structures (anaphor-antecedent) would be predicted. The use of passage rather than sentence context would be expected to generate findings more applicable to a typical school reading situation than the use of single sentences in the testing.

METHOD

Subjects

Subjects used in the study represent samples from four schools, the first three in the United States and the fourth in New Zealand. The population can be said to represent the range of lower middle to upper middle income families, although there are variations in the proportion of lower and higher income families within each of the four samples. All of the children involved were first language English speakers. All of the seven-year-olds were judged to be reading well above 2.0 grade level. Sample I may be described as ethnically mixed, with approximately 33 per cent Caucasian students and the remainder Asian, Philipino, and Hawaiian. Approximately 27 per cent of the children in the sample came from low-income families and about 33 per cent from upper middle income families. The sample chosen included 119 children, ages seven to twelve.

Sample II was made up of students in the Lower School of a private school for academically high achieving children. Although a number of the children came from upper-middle income families, the population might best be described as middle income. The sample was largely Caucasian. It included 122 children, ages seven to eleven. Twelve-year-olds were not included because they were enrolled

in the Upper School.

Sample III was made up of students in a suburban elementary school. Because of the location of the district, a number of the families might be described as rural since farms are located within the district boundaries. Residents of the district are primarily Caucasian with some Asian and Black students. The sample chosen included 230 children, ages seven to twelve.

Sample IV was made up of children from a small New Zealand city of approximately 160,000. The income level can be described as ranging from lower-middle to upper-middle class. The great majority of the students were Caucasian since the city was located on the South Island. The sample chosen included 110 children, ages seven to eleven.

The four-school sample was used in order to look at several effects. The comprehension of three anaphoric ties in forward and backward position was examined with attention to developmental trends. It was the intent to observe the performance of a large number of children representing a broadly defined middle income group of first language English speakers in order to identify key ages for significant growth in anaphoric comprehension. It was thought that if a similar pattern of growth were evident for subjects in all four of the samples, it would be possible to make some judgments about developmental trends. Furthermore, trends that held across national groups might be more accurately attributed to developmental influences than to cultural influences.

Materials

A test of Comprehension of Anaphoric Relationships in Forward and Backward Position was constructed for use in the study. The test consisted of four short stories, each between 100 and 150 words in length. The entire test included twenty-four anaphoric structures, four of each type (pronoun-referent, lexical, substitution/ellipsis) in forward position and four of each type in backward position. The anaphoric types selected for the study were based on Halliday and Hasan's (1976)

discussion of cohesive ties. The six subtypes were distributed throughout the four stories. In all instances, the anaphoric tie was separated from its antecedent by at least one sentence but rarely by more more than two. Thus, the test offered an opportunity to observe comprehension of ties that were not in the immediate position. The following are examples of the anaphoric structures included in the instrument:

Referent Forward

Sandy and Pat were planning a party for one of their friends. It was a birthday party. They were trying to decide what food to have for lunch.

Referent Backward

"Look!" said Tim. "It's great! You should wear it. You'd look fine in a robot mask."

Lexical Forward

"Will you dress as a lion? Maybe you'd like that better. We do have a nice animal costume."

Lexical Backward

"What do you think we should have for dessert?" asked Sandy.

"I know what Ann would like. She'll want ice cream," Kay answered.

Substitution/Ellipsis Forward

"Is Bill going to pitch? asked Tom. "He was really good in the last game."

"I don't know," answered Joe.

Substitution/Ellipsis Backward

"No!" shouted Tim. "This is silly. I won't go out dressed as a clown."

The Substitution/Ellipsis category represented structures which are either deleted or abbreviated in the text. In this test, the corresponding deletion or abbreviation was also present in the text, though separated from the anaphoric structure by at least one sentence. For the purpose of analysis, the Substitution and Ellipsis structures were treated as a single category.

The readability of the test was controlled so that the difficulty of the four stories was estimated at 2.4, 2.1, 1.5 and 2.1 according to the Harris-Jacobson Readability Formula. The readability for the entire test was extimated at 2.0.

Procedures

Subjects were tested in groups in a classroom setting. The investigator conducted all of the testing. The test format was introduced to children by means of an additional practice story which included the types of anaphora present in the test. Children were told to read the entire story first. When they had completed that, they were instructed to locate the first underlined word and find another word or group of words in the story that it referred to. They were to draw a line around the word or words and extend that line to the underlined word. Although the test format was new to many of the children, they seemed to have little trouble with it. There was no time limit on the test. Children were encouraged to read each story and work through all the words in the story before going on to the next story.

Analyses

Analysis of data from language studies can produce inaccurate results when items are treated as fixed rather than random variables. In order to avoid that problem, the statistical procedures proposed by Clark (1973) were followed. A three part analysis of variance was performed. The first part was an analysis in which the random factor was the subjects in the experiement (F_1) and the second part an analysis in which the test items were considered the random factor (F_2). The third step involved calculation of minF', derived from F_1 and F_2. Just as a sample is drawn from a population of subjects, so a sample of items is drawn from a population of possible items. The Clarkian analysis makes it possible to generalize findings more accurately to other similar items not included in the test.

RESULTS

The proportion correct for each anaphoric type by age group is shown in Table 1. For seven-year-olds, the order of easy to difficult was Lexical to Referent to Substitution/Ellipsis (.41 > .30 > .14). The pattern for all other age groups was Referent to Lexical to Substitution/Ellipsis with the following proportions: age eight (.56 > .53 > .20), age nine (.65 > .62 > .28), age ten (.67 > .58 > .36), age eleven (.75 > .61 > .39) and age twelve (.73 > .56 > .40). The growth in comprehension of Referent structures is consistent from age seven to age eleven, with a slight drop at age twelve. The growth in Lexical structures shows gains from age seven to age nine where the proportion of correct responses is highest, with a drop at age ten, a gain at age eleven, and a drop again at age twelve. The growth pattern for Substitution/Ellipsis structures shows gains at each age level including twelve.

The proportion correct for forward (antecedent-anaphor) and backward (anaphor-antecedent) structures for each age group is also shown in Table 1. The pattern for forward structures shows consistent gains through age eleven and no change in proportion between ages eleven and twelve. The pattern for backward structures shows gains at each age level to eleven and a drop between ages eleven and twelve. The change in pattern at age twelve may be explained by the fact that children from only two sample schools are represented at the twelve-year level and children from the high ability school are not included.

----Insert Table 1 here----

The proportion correct for each anaphoric structure in forward and backward position is shown in Table 2. The predicted superiority on forward ties appears for Substitution/Ellipsis structures at all ages and for Referent structures at all ages except seven. In the case of Lexical structures, superiority on forward ties does not appear until age ten. The graph in Figure 1 shows the pattern for all structures and tie directions over the six-year age span included in the study.

--- Insert Table 2 and Figure 1 about here ----

In order to determine whether there were differences among the four school samples, the Newman-Keuls test was performed on subscores and total score of the Anaphoric Relationships Test. Results indicated that consistently Sample II (from the academically high achieving group) was higher ($p=.05$) than Sample III (suburban/rural) and Sample IV (New Zealand) and they, in turn, were higher than Sample I. Even though the differences were significant, the four schools were treated as one group in the analysis. That was done because the middle group, Samples III and IV, constituted more than half of the total number of subjects (340 of 581) and the numbers of students in the lowest sample (119) was nearly equal to the number in the highest sample (122). The intent was to use a large and representative sample in order to identify comprehension levels which might constitute a norm for a middle class first language English population. Furthermore, examination of patterns of growth for the four groups was included in the analysis so that common patterns might be observed even though the rate of growth differed. A comparative summary of proportion of structures correct for each age group by sample is shown in Table 3.

---- Insert Table 3 here ---

Examination of the figures reveals the superiority of Sample II over the other samples in most, but not all, structures. In general, where one sample shows growth from one age to the next, that growth is evident in the other samples, as well. Similarly, where one sample regresses from one age to another, notably between ages nine and ten, the trend is for the other samples to show the same pattern. The regression was true for all four samples on Lexical structures, for three of the four samples on Backward ties, and for two of the four on Referent structures. In the case of the Backward ties, the fourth school made only a gain of .01 and in the case of the Referent structures, the two samples that showed gains increased by only .03 and .04. It should be pointed out that the scores for

seven-year-olds were based on a very small sample from each school, necessarily limited because it was important to include only those children whose reading level was high enough to allow them to handle the test adequately.

Analyses of variance performed according to the procedures recommended by Clark (1973) are summarized in Table 4. When data from the four-school sample were analyzed, the results indicated significant main effects for age [min F' (5,611) = 9.87, $p<.001$], type [min F'(2,125)= 18.00, $p<.001$], and direction [min F'(1,198)= 3.71, $p<.10$]. There was a significant interaction effect for type by direction [min F'(2,207)= 5.22, $p.<.01$]. The significant age effect indicated the steady increase in proportion of total test items correct from age seven (.28) through age eleven (.59) with a slight decrease between ages eleven and twelve (.56). That decrease may be attributed to the fact that only two of the four samples were included at age twelve and the group did not contain students from the high achieving sample.

---- Insert Table 4 here ----

The significant main effect for type of anaphoric structure indicated a clear rank ordering of Referent to Lexical to Substitution/Ellipsis structures from easiest to most difficult, with the exception of the seven-year-olds where the order was Lexical to Referent to Substitution/Ellipsis. The min F' results indicated a weak significant effect for direction. For all subjects except seven-year-olds, Forward ties were more easily comprehended than Backward structures.

Examination of the interaction effect indicated that seven-, eight-, and nine-year-olds performed better on Lexical Backward ties than on Referent Backward ties and ten-, eleven-, and twelve-year-olds were higher on Referent Backward than Lexical ties in either Forward or Backward position. All subjects performed better on Referent Forward than Lexical Forward structures. Ten-, eleven-, and twelve-year-olds scored higher on Lexical Forward than on Lexical Backward ties

but seven-, eight-, and nine-year-olds scored higher on Lexical Backward than on Lexical Forward structures.

The Newman-Keuls multiple comparisons test was performed to determine significant differences between adjacent age groups in comprehension of specific anaphoric ties and tie directions. A summary of significant results is included in Table 5. The entire group (N=581) was included in the analysis and all results discussed here were significant at the .05 level. There were significant differences in performance between age groups seven and eight, eight and nine, and ten and eleven in comprehension of Referent structures and between age groups nine and ten on Substitution/Ellipsis structures. There were no significant differences between adjacent age groups on Lexical ties or on Forward ties but there was a significant difference between ages eight and nine in comprehension of Backward ties. When the total scores on the Anaphoric Relationships Test was used for analysis, there was a significant difference between eight-and nine-year-olds but not between any of the other adjacent age groups.

----Insert Table 5 here----

Comparison of Results with Other Reported Findings

When data from this four-sample study were compared with results of other studies of anaphoric comprehension, a number of common trends were evident as well as some contrasts. Chomsky's study of oral comprehension of syntactic structures provides information for comparison of oral comprehension with comprehension of written structures. Cole's (1974) interpretation of Chomsky's data adds information on the influence of direction (antecedent first or anaphor first) on oral comprehension. Data indicate that subjects comprehended forward pronominalization structures quite well but had trouble with backward pronominalization. According to Cole's interpretation of Chomsky's data, it is possible to derive the proportion of comprehension of oral language structures for each age group

as shown below. Comparable data from the present study is shown in parentheses.

	forward structures		backward structures	
Ages 5-6	82%		38%	
Ages 6-7	83%		23%	
Ages 7-8	83%	(45%)	29%	(41%)
Ages 8-9	95%	(63%)	40%	(57%)
Ages 9-10	76%	(69%)	53%	(62%)

It is clear that subjects in the present study comprehended the written forward pronominalizations less well than Chomsky's subjects comprehended the oral forms. The results, however, show the opposite pattern with children in this study comprehending the written structures better than Chomsky's subjects comprehended the backward structures in the oral testing situation.

Results from the study reported by Barnitz (1980) and those from the present study are summarized below.

		Barnitz	Monson
Forward Pronoun Ties (all)		.70	.72
Backward Pronoun Ties (all)		.58	.63
Grade two:	Forward Ties	.60	.47
	Backward Ties	.47	.42
Grade four:	Forward Ties	.70	.72
	Backward Ties	.58	.65
Grade Six:	Forward Ties	.81	.81
	Backward Ties	.69	.68

For the purpose of comparison, scores from the present study were analyzed by grade level rather than by age group. The second graders in this study comprehended a considerably lower proportion of the forward pronoun structures than shown in the Barnitz study, the fourth graders were quite similar in comprehension of forward structures and somewhat higher in comprehension of backward structures than

results reported by Barnitz, and the sixth graders in the two studies produced nearly identical results.

Comparison of the results with those obtained by Moberly is shown below.

		Moberly	Monson
Grade four:	Referent	.69	.69
	Lexical	.59	.66
	Subst./Ellipsis	.59 (.61,.57)	.31
Grade six:	Referent	.75	.74
	Lexical	.66	.62
	Subst./Ellipsis	.73 (.75,.72)	.36

There is a clear similarity between the two studies in results for Referent structures and not a great deal of difference for Lexical structures. However, in the case of Substitution/Ellipsis items, the results are greatly different.

In summary, the results of the present study indicate some differences in the patterns of anaphoric comprehension among the four samples. However, it is possible to identify trends that hold across the total group. In general, there is a consistent pattern of growth in comprehension from one age level to the next with the proportion correct for the entire group ranging from .28 at age seven to .43 at age eight, .51 at age nine, .58 at age ten, .59 at age eleven, and .56 at age twelve. The likely reason for a drop at age twelve has been discussed. According to results on the Newman-Keuls test, the only significant gain between adjacent age groups for the total anaphoric score occurred between ages eight and nine.

Examination of performance on anaphoric types and directions indicates that Substitution/Ellipsis structures were most difficult for all age groups and that Referent structures were easiest for all except the seven-year-olds who found Lexical structures easiest to comprehend. Results also indicate that all age groups except seven-year-olds found Forward structures easier to comprehend than

Backward structures, although for the eight- and nine-year-olds, there was little difference between the two directions. Data from this study do not show that older students find Forward and Backward structures of similar difficulty; rather, they continue to have trouble with the Backward structures into age twelve.

Comparison of data from this study with other reported findings suggests that scores for these subjects were more alike for comprehension of forward and backward pronominalization structures in writing than scores for children of comparable ages on oral structures. Furthermore, comprehension of the written structures in backward position was higher than comprehension of oral structures for children ages seven to eight, eight to nine, and nine to ten. Comparison with other studies of comprehension of written structures indicates similarities in understanding of Referent and Lexical structures, particularly at the upper grade levels, but sizable differences in reported comprehension of Substitution/Ellipsis structures.

DISCUSSION

Interpretation of the results must take into account characteristics of the subjects and of the test used. The study involved a large number of children, all first language English speakers, from four school locations. One of the schools was located in New Zealand. The children represented a range of scholastic achievement, including low achievers and high achievers as well as large group of students who might be described as typical achievers.

The test of Anaphoric Relationships was constructed with passages rather than sentence pairs in order to provide a richer context and a testing situation more similar to the usual classroom reading experience. Three anaphoric structures (Referent, Lexical, and Substitution/Ellipsis) were included as well as tie locations in forward and backward position. The tie locations did not appear

in immediately adjacent sentences but were separated by at least one sentence and in no case more than three. In that sense, the ties may be considered remote rather than immediate. The four passages were constructed so as to be within the reading capability of children ages seven and upward.

The comparison of data from this study with results from other studies indicated close agreement where Referent ties were concerned although results for the youngest subjects (second grade) in this study were lower than results reported by Barnitz (1980). The results may have been influenced by test items or by difference in test format. The number of children tested at that age level was small (N=16) and that, too, may have contributed to the effect.

The superiority of comprehension of Referent ties over Lexical or Subsitution/Ellipsis ties was evident in this study. When all subjects were included in the analysis, comprehension of Referent structures was significantly greater ($p < .001$) than comprehension of Lexical structures and comprehension of Lexical structures was significantly greater ($p < .001$) than comprehension of Substitution/Ellipsis structures. That was true for results reported by Moberly (1978) at grades four and six, although differences were relatively small for fourth graders in this study but significant for fourth graders in the Moberly study. Differences between Lexical and Substitution/Ellipsis structures were far greater in this study than those reported by Moberly.

The poor performance on comprehension of Substitution/Ellipsis structures by children in this study deserves consideration, particularly since the performance on Referent and Lexical structures in the two studies did not differ greatly. The Ellipsis and Substitution items occur as abbreviations or deletions of text. The reader is called upon to utilize cues from the text in order to achieve cohesion within the framework of schemata being used. The more fully developed the text, the more cues are available to the reader. In fact, the richness of text would seem especially important when the reader must deal with deletion or

or abbreviation of a structure. Moberly (1978) found relatively good comprehension of Ellipsis and Substitution by her fourth and sixth graders. Findings from the present study do not bear that out. The test instrument used in the Moberly study included two well developed short stories, each about 1,000 words. In contrast, the test instrument in this study included four short stories, each about 150 words in length. Differences in number of cues available to the reader may have influenced the results markedly.

The drop in comprehension of backward (anaphor-antecedent) Lexical anaphora between ages nine and ten was not expected nor did it occur in comprehension of forward (antecedent-anaphor) Lexical ties for these subjects or for Moberly's subjects between grades four and six. Yet it appeared in performance of all four school samples in this study, indicating a cross-national trend. The same test was used for nine- and ten-year-olds and a relatively large number of children (N=130 and 159) were tested at each age level. Therefore, it would seem that neither the test nor the sample used should have strongly affected the results. That leads to consideration of the search strategy a reader utilizes for achieving cohesion in Lexical ties. If that is a key factor, knowledge about the schemata generated in passage-contextual processing may contribute information about comprehension of anaphoric ties.

Comprehension of Lexical ties produced another interesting and somewhat puzzling pattern. Children ages seven, eight and nine comprehended backward ties better than forward ties. From age ten through twelve, there was a reverse trend with increasingly better comprehension of forward ties with increase in age. The contrast was dramatic at age seven (.25 for forward and .56 for backward ties) and fairly strong in the opposite direction at age twelve (.64 for forward and .47 for backward ties). The test was examined to determine whether the change might be attributed to semantic effects from the composition of the items.

Garrod and Sanford (1977) identified two effects of conjoint frequency which they defined as low and high conjoint frequency, indicating relative semantic distance between the anaphor and antecedent. An example of a low conjoint tie might be "dwelling/hovel." A high conjoint frequency pair might be "dwelling/house." Garrod and Sanford also identified an effect which they termed category-first/instance-last and instance-first/category-last effects. A category-first anaphoric tie might be "dwelling/house," whereas the instance-first effect would appear as "house/dwelling." Garrod and Sanford studied adult comprehension of these structures in sentence groups. They found that low conjoint frequency sentences required longer reading time than high conjoint frequency sentences. The adults in the Garrod and Sanford study read the category-last sentences faster (and presumably more effectively) than the instance-last sentences.

When the Lexical backward items in this study were examined in terms of conjoint frequency, it was evident that two of the items were high conjoint frequency, one was average, and the fourth was low. The Lexical forward items included three low conjoint frequency items and one that was judged to be about average. If these young readers were influenced by the conjoint frequency in the same way that Garrod and Sanford's adult readers apparently were, that might have had some influence on the results.

When the items were analyzed for the category-last/instance-last quality, it appeared that the backward Lexical items included three instance-last and one category-last item. The forward Lexical items included three category-last and one instance-last item. If that factor had any influence on the comprehension of subjects in this study, it would appear that the pattern for children ages seven through nine was opposite the pattern for the adult readers while the pattern for ages ten through twelve increasingly approached the pattern for adult comprehension. Any such conjecture is extremely tenuous, of course, since

the test was not constructed with either conjoint frequency or category-last/ instance-last format in mind. Other factors may have been operating to influence the pattern of Lexical anaphoric comprehension. Certainly it is important to recognize that schema-generating styles may be different for older readers than for younger ones. However, data from this study do not provide information about schemata the readers may have used.

The contrast between comprehension on this written test and results reported in Chomsky's (1969) study of oral language comprehension may reveal differences in language processing for written and oral language. The subjects in this study comprehended a larger proportion of the pronoun-referent backward structures than did Chomsky's sutjects, which may be an indication that elementary age children are capable of utilizing backward as well as forward processing of print in order to recognize the components of an anaphoric tie. Further research is needed in order to gain more information about the nature of that processing.

Effect of instruction may also give some indication of whether the grasp of certain anaphoric structures and tie directions is tied to developmental patterns or whether it can be influenced by instruction. Durkin (1981) has indicated that very little attention is given in reading lessons and teaching guides to helping children understand anaphora. In her extensive review of the content of teachers manuals for five basal reader series, Durkin points out that none of the manuals treats instruction in comprehension of anaphora in any detail. If children do, indeed, have difficulty comprehending certain types of anaphora at specified age levels, as results of this study suggest, it would seem important to develop teaching strategies for teachers to use in basal instruction. Before decisions are made for placement of anaphora within the reading curriculum, however, instructional studies are needed in order to determine at which age(s) children are able to make the greatest gains from the instruction and to hold those gains over time. It may be that young children are not

developmentally ready to deal with some of the more complex constructs and so the instructional time would be wasted.

Results from this study indicate significant growth in comprehension of Referent structures between ages seven and eight, in comprehension of Substitution/Ellipsis structures between ages nine and ten, and in comprehension of backward (anaphor-antecedent) ties between ages eight and nine. In order to test the effects of development and instruction, instructional studies might be designed to test the effect of intervention on Referent comprehension at age seven, on Subsitution/Ellipsis comprehension at age nine, and on comprehension of backward ties at age eight. If the effects of instruction are significant and hold over time and if the level of performance of the subjects rises to approximate performance of children in the next adjacent age group, there would be a basis for discounting the influence of developmental level on anaphoric comprehension. On the other hand, if performance is not raised significantly with lasting effect, it could be argued that there is a developmental effect operating which interferes with ability of younger children to deal with some structures.

Moberly and Monson (1981) looked at the effect of instruction on comprehension of four anaphoric forms identified by Halliday and Hasan (1976). Subjects were fifth graders, assigned to either an experimental or control group. Instruction in comprehension of the four anaphoric ties in immediate, mediated and remote positions was carried out over a period of three months. The posttest indicated that the experimental group scored significantly higher than the control group. A second posttest eight months later again revealed significantly higher scores for the experimental group on these structures: substitution immediate, substitution remote, referent remote, and ellipsis in immediate, mediated and remote positions. On all other structures, differences favored the experimental group but were not significant. The results seem to indicate that students may

have been developmentally ready to profit from instruction on some but not all of the structures.

The development of anaphoric comprehension appears to move rather slowly during the elementary school years. Chapman (1980) reported results of a study of perception of textual cohesion which indicated that mastery of some processes was still being acquired as late as age fourteen. Only about three-fourths of the Referent items were comprehended by the eleven- and twelve-year-olds in this study. Results for Lexical and Subsitution/Ellipsis items were even lower, with fewer than two-thirds of the Lexical items comprehended by any age group and fewer than one-half of the Subsitution/Ellipsis items comprehended by any group. There is a need for information about the comprehension of anaphoric structures by young people at the junior and senior high levels in order to learn more about expected growth patterns and effect of instruction.

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TABLE 1

Proportion of Anaphoric Structures and Tie Directions
Comprehended by Each Age Group Across All Four Samples

AGE	REFERENT	LEXICAL	SUBSTITUTION/ ELLIPSIS	FORWARD	BACKWARD	TOTAL
seven	.30	.41	.14	.24	.32	.28
eight	.56	.53	.20	.44	.41	.43
nine	.65	.62	.28	.54	.52	.51
ten	.67	.58	.36	.62	.49	.58
eleven	.75	.61	.39	.63	.54	.59
twelve	.73	.56	.40	.63	.50	.56
TOTAL	.66	.58	.32	.56	.49	.53

TABLE 2

Proportion of Anaphoric Types by Direction Comprehended by Each Age Group Across All Four Samples

AGE	REFERENT Forward	REFERENT Backward	LEXICAL Forward	LEXICAL Backward	SUBST./ ELLIPSIS Forward	SUBST./ ELLIPSIS Backward
seven	.31	.47	.25	.56	.17	.11
eight	.68	.53	.52	.55	.23	.17
nine	.67	.62	.57	.68	.30	.25
ten	.71	.63	.59	.58	.44	.30
eleven	.83	.68	.63	.60	.44	.34
twelve	.78	.69	.64	.47	.46	.35
TOTAL	.70	.62	.58	.59	.36	.27

TABLE 3

Proportion of Anaphoric Structures and Tie Direction Correct for Each Age Group by Sample

	REFERENT				LEXICAL				SUBSTITUTION/ ELLIPSIS				FORWARD TIES				BACKWARD TIES			
	Sample				Sample				Sample				Sample				Sample			
ASL	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
seven	.38 (N=5)	.44 (N=2)	.19 (N=2)	.25 (N=7)	.50	.25	.50	.36	.10	.06	.50	.09	.27	.21	.38	.20	.38	.29	.42	.26
eight	.39 (N=27)	.72 (N=23)	.56 (N=20)	.60 (N=27)	.38	.63	.50	.62	.10	.23	.26	.22	.30	.57	.43	.43	.30	.46	.45	.46
nine	.63 (N=30)	.78 (N=26)	.57 (N=48)	.66 (N=26)	.50	.76	.62	.61	.14	.41	.25	.34	.53	.64	.46	.56	.43	.67	.51	.52
ten	.59 (N=26)	.81 (N=50)	.61 (N=59)	.60 (N=24)	.34	.71	.57	.59	.15	.51	.29	.44	.40	.77	.62	.56	.32	.59	.47	.53
eleven	.67 (N=26)	.82 (N=21)	.74 (N=55)	.80 (N=27)	.58	.54	.59	.76	.20	.60	.38	.42	.51	.79	.61	.67	.46	.52	.53	.65
twelve	.70 (N=27)		.74 (N=45)		.60		.55		.23		.42		.53		.64		.48		.50	

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TABLE 4

Table of F-ratios by Subjects (F_1), F-ratios by Items (F_2), and Quasi F-ratios (min F')

Source	F_1	F_2	minF'
Age	F(5,575)= 13.8****	F(5,108)= 34.63****	F(5,611)= 9.87****
Referent Type	F(2,1150)= 250.0****	F(2,108)= 19.40****	F(2,125)= 18.00****
Age X Referent Type	F(10,1150)= 5.4****	F(2,108)= 1.39	F(10,171)= 1.11
Direction	F(1,575)= 13.7****	F(1,108)= 5.08**	F(1,198)= 3.71*
Age X Direction	F(5,575)= 7.6****	F(5,108)= 1.62	F(5,160)= 1.33
Referent Type X Direction	F(2,1150)= 18.4****	F(2,108)= 7.29***	F(2,207)= 5.22***
Age X Referent Type X Direction	F(10,1150)= 4.3****	F(10,108)= .66	F(10,145)= .57

**** < .001
*** < .01
** < .05
* < .10

TABLE 5

Significant Gains between Adjacent Age Levels for Anaphoric Structures and Tie Directions, by Sample and for Total Group*

STRUCTURE	Sample 1 (N=119)	Sample 2 (N=122)	Sample 3 (N=229)	Sample 4 (N=110)	Total Group (N=581)
Referent	-------	7 to 8	-----	7 to 8	7 to 8;
Lexical	-------	10 to 11	-----	7 to 8; 10 to 11	-------
Substitution/ Ellipsis	-------	---------	-------	--------	9 to 10
Forward	-------	7 to 8	-------	7 to 8; 10 to 11	-------
Backward	--------	-------	--------	7 to 8	8 to 9
Total Score	--------	------	-------	7 to 8	8 to 9

*All gains shown are significant (p=.05) on the Newman-Keuls Test

FIGURE 1

Interaction Effects for Anaphoric Type and Direction by Age